

REMARKS

Claims 1-4, 53, 55, 67 and 75-92 are pending in this application. Claims 1-4, 53, 55, 67 and 75-92 have been rejected by the Examiner. Claims 67 and 92 have been canceled by this amendment, leaving claims 1-4, 53, 55 and 75-92 in the application. Claims 79-91 have been amended to depend directly or indirectly from claim 1.

35 USC §103 Rejections

Claims 1-4, 53, 55, 67 and 75-92 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,858,457 to Brinker et al ("Brinker"), US Patent No. 5,858,457.

Claims 1, 53, 55 and 75 are all dependent claims. For the reasons discussed below, having to do with dehydroxylation, additional carbon groups, or disordered porosity, Brinker does not teach the invention as claimed in these claims.

Dehydroxylation

Claim 1, as amended, requires that the film be a 'dehydroxylated' film. As pointed out by the Examiner, a process limitation in a product claim must be evidenced as affecting the structure or chemistry of the resultant product over the prior art. As has been previously discussed, and supported by the affidavits submitted previously, dehydroxylation alters the film such that it remains stable in humid environments.

Applicants apologize for the delay in submitting the affidavits in conjunction with the Request for Continued Examination. Applicants believe that the Examiner has received them, although after the mailing of this current office action. Applicants have included a copy with this office action to ensure the Examiner has received them.

The alteration of the film, borne out by these affidavits, does affect the structure or chemistry of the product over the prior art. As such, it is therefore submitted that claims 1 is patentably distinguishable over the prior art and allowance of this claim is requested.

Claims 2-4, and 79-91 depend from claim 1. As such, it is submitted that the prior art does not show, teach nor suggest the subject matter of the base claim, much less the added limitations of the dependent claims.

Specifically, with regard to claims 2-4 and 91, the prior art does not show, teach nor suggest a dehydroxylated thin film have an average pore diameter of less than or equal to 10 nanometers as in claim 2, or a thickness having a standard deviation of +/- 5% as in claim 3, nor the use of a carbon-group containing precursor sol and surfactant in claim 91.

With regard to claim 4, it must be noted that the Figure 8 of the Brinker reference is difficult to read, but does not appear to show a disordered porosity as defined by a peak between about 0.75 and 2 degrees 2-theta, or the absence of a peak in the range of 2-6 degrees 2-theta. Figure 8, incorrectly referred to in the text of Brinker as Figures 8a and 8b that do not exist, appears to show a peak between 0 and 0.5 degrees 2-theta. Looking at Figure 8, it appears that the x-axis between 0 and 2 has 3 delineation marks, apparently at 0.5, 1.0 and 1.5. As can be seen in this figure, the peaks for the heated wafer (squares), 25% relative humidity (caret), 100% relative humidity (solid triangles), and 35% relative humidity (dashed line) all have a peak between 0 and 0.5 degrees 2-theta. Therefore, Brinker's teachings do not include "the range of the disordered porosity of the instant claimed invention." It is therefore submitted that claims 2-4 are patentably distinguishable over the prior art and allowance of this claim is requested.

With regard to dependent claims 79-90, there is no mention in Brinker of dehydroxylation of any kind, so these claims should be ruled allowable. As discussed previously, the dehydroxylation process claimed produces a film that has different structure or chemistry than the films produced by the prior art. Therefore, it is submitted that claims 79-90 are patentably distinguishable over the prior art and allowance of these claims is requested.

Stability-Disordered Porosity

Claims 53 and 75 are directed to films having disordered porosity that has a stable dielectric constant. As discussed above with regard to claim 4, Brinker does not appear to teach the disordered porosity in the ranges claimed in claims 53 or 75. Figure 8, incorrectly referred to in the text of Brinker as Figures 8a and 8b that do not exist, appears to show a peak between 0 and 0.5 degrees 2-theta. Looking at Figure 8, it appears that the x-axis between 0 and 2 has 3 delineation marks, apparently at 0.5, 1.0 and 1.5. As can be seen in this figure, the peaks for the heated wafer (squares), 25% relative humidity (carets), 100% relative humidity (solid triangles), and 35% relative humidity (dashed line) all have a peak between 0 and 0.5 degrees 2-theta. Therefore, Brinker's teachings do not include "the range of the disordered porosity of the instant claimed invention."

In addition, even though Brinker showed that the order or disorder of the porosity did vary using different relative humidities, it does not teach the range of the claimed invention, and teaches away from the desirability of having a disorder film. Brinker is directed specifically to obtaining a porosity having a peak between 2 and 6 degrees 2-theta, specifically outside of the ranges claimed in the instant invention. It is therefore submitted that claims 53 and 75 are patentably distinguishable over the prior art and allowance of these claims is requested.

With regard to claims 76-78 that depend from claim 75, the prior art does not show the use of methyl and ethyl groups in a silica precursor for a thin film having the disordered porosity as in claim 76, using alkyl and phenyl groups in a silica precursor for a thin film having the range of disordered porosity as in claim 77, or precursor sol and surfactant using carbon containing groups for a thin film as in claim 78. It is therefore submitted that claims 76-78 are patentably distinguishable over the prior art and allowance of these claims is requested.

Stability-Carbon Containing Groups

Claim 55 is directed to a thin film produced using a silica precursor having carbon relative to silica in amounts not described in the prior art and a surfactant containing carbon. This is supported in the specification in the description of Example 5 page 23, lines 8-15. Brinker describes a standard silica precursor (TEOS) containing carbon as noted by the Examiner. However, nowhere does Brinker describe the addition of mono- and di-alkyl substituted alkoxysilanes as does the instant invention. The impact of these additions is to increase the carbon content of the overall silica precursor mixture to levels that exceed the carbon to silica ratio present in the TEOS solutions used by Brinker and others in the prior art. The addition of these higher levels of carbon lead to films with a much more stable dielectric constant than would be present in the films produced according to the process described by Brinker. It is therefore submitted that claim 55 is patentably distinguishable over the prior art and allowance of this claim is requested.

No new matter has been added by this amendment. Allowance of all claims is requested. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

Respectfully submitted,

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I hereby certify that this correspondence is being transmitted to the U.S. Patent and Trademark Office via facsimile number (703) 872-9306, on June 8, 2004.

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